

REMARKS

Claims 33-86 are pending in the present application. Claims 56-86 have been withdrawn from consideration pursuant to a restriction requirement. Claims 43, 45 and 46 have been cancelled and Claims 35, 39, 41, 46, 47, 49, 51, 53 and 55 have been amended. No new matter has been added. Accordingly, entry of the present Amendment is requested.

As an initial matter, Applicant gratefully acknowledges the courtesy extended to Applicant and his undersigned representative during the interview conducted May 30, 2003.

Additionally, Applicant notes the Examiner's indication on page 8 of the Office Action that "a determination of [the issues of the Applicant's Requests for Declaration of an Interference] has resulted in a decision not to declare an interference at the present time." Applicant understands the Examiner's decision to be a reflection of the fact that none of the examined claims have been deemed allowed at this time, and not an indication of the Examiner's position relative to the merits of Applicant's Rule 607 Request for Declaration of an Interference.

Referring to page 3 of the Office Action, Applicant affirms the election of Group I, Claims 33-55.

Referring to page 4 of the Office Action, it is noted that the claimed invention is directed to a method and it is suggested that the Abstract be amended to reflect the same.

However, Applicant notes that the Abstract of the Disclosure presently indicates that the invention is directed to "a chemical vapor deposition process" Accordingly, the present Abstract does reflect the fact that the claimed invention is directed to a method and Applicant respectfully submits that no amendment to the Abstract is necessary at this time.

Also on page 4, it is indicated that the title of the invention is not descriptive.

In response, Applicant has amended the title as follows --METHOD FOR DEPOSITING TITANIUM OXIDE COATINGS ON FLAT GLASS--. Accordingly, withdrawal of the criticism of the title is requested.

On pages 4-6 of the Office Action, Claims 33-55 have been rejected under 35 U.S.C. §112, first paragraph, as assertedly containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention.

Several criticisms of the claims are set forth in connection with this rejection. Each criticism is addressed in turn below.

Claim 33 has been criticized with respect to the terms “first major surface” and “opposite major surface”. In particular, it is indicated that these limitations introduce new matter. It is also indicated that the same criticism applies to Claims 35, 47 and 49.

Applicant respectfully traverses this portion of the rejection for the following reasons.

Claim 33 recites, in relevant part, “manufacturing a continuous glass float ribbon having a first major surface and an opposite major surface defined as a second major surface.” As one of ordinary skill in the art would appreciate, float glass installation 10 in accordance with the present claimed invention (See Fig. 1), produces glass ribbon 18 which is shown in more detail in Fig. 2. It is readily apparent from at least those drawings that the glass ribbon produced in accordance with the present invention would include a first major surface and an opposite major

surface. Accordingly, Applicant respectfully submits that these terms do not introduce new matter into the application and withdrawal of this portion of the rejection is requested.

Claim 33 has also been criticized with respect to the limitation “tin diffused therein.” It is asserted that this phrase also introduces new matter and the same criticism applies to Claims 35, 47 and 49.

Applicant also respectfully traverses this portion of the rejection.

Claim 33 recites, in relevant part, “[a] first major surface having tin diffused therein characteristic of forming the glass float ribbon on a molten tin bath.” Applicant respectfully submits that, as one of ordinary skill in the art would appreciate, when forming a glass ribbon on a tin bath in a float glass installation, there will necessarily be an amount of tin that is diffused into the glass ribbon at the surface in contact with the tin bath. Indeed, Claim 33 indicates that tin diffusion is “characteristic of forming the glass float ribbon on a molten tin bath.”

Accordingly, Applicant respectfully submits that the phrase “tin diffused therein” recited in Claims 33, 35, 47 and 49 of the present application does not introduce new matter. Accordingly, withdrawal of this portion of the rejection is requested.

Claim 33 has also been criticized as introducing new matter with respect to the phrase “positioning a chemical vapor deposition coating apparatus over the surface of the float ribbon.” It is also indicated that the same criticism applies to Claims 35, 47 and 49.

Applicant also respectfully traverses this portion of the rejection.

The relevant portion of Claim 33 recites “positioning a chemical vapor deposition coating apparatus over the surface of the float ribbon at a point in the manufacture of the float ribbon

where the temperature ranges from about 590° to 715°C." As illustrated in Fig. 1 of the present application, float glass installation 10 includes bath section 16 as well as annealing Lehr 20. Gas distributor 64, 66 and 68 are included in bath section 16 as well as tubes 44 for supplying non-oxidizing atmosphere. The operation of this apparatus is described at page 12, *et seq* of the specification. Clearly, the specification describes a chemical vapor deposition coating apparatus over the surface of a float ribbon as recited in Claims 33, 35, 47 and 49. As such, Applicant respectfully submits that the language at issue in this portion of the rejection does not introduce new matter. Accordingly, withdrawal of this portion of the rejection is requested.

Claim 33 is also criticized with respect to the term "in the crystalline phase." Specifically, it is indicated that this phrase assertedly introduces new matter. It is further indicated that Claims 35, 41, 47, 49, 51 and 55 also introduce new matter because of the presence of this phrase. Applicant also respectfully traverses this portion of the rejection.

Claim 33 recites in relevant part "directing titanium tetrachloride in a carrier gas stream through said chemical vapor deposition apparatus over a surface of the float ribbon and annealing the float ribbon to produce titanium dioxide in the crystalline phase as a photocatalytically-activated self-cleaning coating over the glass float ribbon." Applicant respectfully submits that, as would be appreciated by one of ordinary skill in the art, when the titanium dioxide is deposited and annealed in accordance with the present invention, it will be in the crystalline phase. This is evidenced by Example 1 of the present application. See, page 18 of the specification, lines 1-11, in particular the refractive indices and carbon content identified, which one of ordinary skill would appreciate is indicative of titanium dioxide in the crystalline

phase. Further, Applicant also attach hereto a Declaration by Dr. Richard McCurdy in which the crystallinity of the material produced in accordance with Example 1 of the present application has been confirmed. *See*, paragraph 8.

Accordingly, Applicant respectfully submits that this phrase does not add new matter to the specification and withdrawal of this portion of the rejection is requested.

Claim 33 has also been criticized with respect to the phrase “photocatalytically-activated self-cleaning coating.” Specifically, it is indicated that this phrase introduces new matter and the same criticism applies to Claims 35, 37, 40-43, 47, 49, 51, 54 and 55.

Applicant respectfully traverses this portion of the rejection for the following reasons.

The relevant language of Claim 33 recites “directing titanium tetrachloride in a carrier gas stream through said chemical vapor deposition apparatus over a surface of the float ribbon and annealing the float ribbon to produce titanium dioxide in the crystalline phase as a photocatalytically-activated self-cleaning coating over the glass float ribbon.”

As demonstrated in the attached Declaration by Dr. McCurdy, the samples prepared in accordance with Example 1 of the present application inherently exhibits photocatalytic, self-cleaning. *See* paragraphs 9-11. Accordingly, withdrawal of this rejection is requested.

Claim 35 has been criticized as introducing new matter with respect to the term “annealing the float ribbon in air.” It is also indicated that the same criticism applies to Claim 49.

Applicant respectfully traverses this portion of the rejection for the following reasons.

As discussed above, Fig. 1 of the present application clearly discloses that a portion of the present claimed invention includes annealing the glass ribbon 18 in annealing Lehr 20. Accordingly, Applicant respectfully submits that this phrase does not introduce new matter and withdrawal of this portion of the rejection is requested.

Claim 37 and 51 are also criticized as introducing new matter with respect to several phrases. These phrases are not repeated here for the sake of brevity.

Applicant also respectfully traverses this portion of the rejection for the following reasons.

The language which is criticized in this portion of the rejection is all recited in the preamble of Claims 37 and 51. Claims 37 and 51 are Jepson-type claims. Accordingly, the improvement or invention is recited in the language after the transitional phrase “the improvement comprising.” All of the language that has been criticized in this portion of the rejection relates to a conventional float glass installation. The invention described in the present application utilizes the well known float process. *See*, the Background of the Invention section of the application. Accordingly, Applicant respectfully submits that the language which has been criticized in this portion of the rejection does not introduce new matter into the specification. Withdrawal of this portion of the rejection is requested.

Claims 39, 41, 46, 53 and 55 have been criticized as introducing new matter with respect to the limitation “up to 1300 angstroms.”

While not admitting that this portion of the rejection is appropriate, Applicant has amended each of Claims 39, 41, 46, 53 and 55 to recite a coating thickness of 1300 angstroms.

Accordingly, withdrawal of this portion of the rejection is requested. This thickness is supported by the examples in which coatings of such a thickness were prepared.

Claims 42 has been criticized with respect to the phrase “said silica layer inhibits migration of sodium ions . . . self-cleaning coatings.” Specifically, it is indicated that this phrase introduces new matter.

Applicant also respectfully traverses this portion of the rejection.

The relevant portion of Claim 42 recites “depositing a photocatalytically-activated self-cleaning coating by chemical vapor deposition over said silica layer whereupon said silica layer inhibits migration of sodium ions from the surface of said article to said photocatalytically-activate self-cleaning coating.”

Applicant respectfully submits that the silica layer would inherently inhibit migration of sodium ions from the surface of the coatings to the photocatalytic-activated self-cleaning layer, as demonstrated by the attached copy of U.S. Patent No. 6,265,076. See, col. 3, lines 29.

Claim 43 has been criticized with respect to the phrase “annealing the photocatalytically-activated self-cleaning coating to increase . . . self-cleaning coating.”

Without admitting that this rejection is correct, Claim 43 has been cancelled..

Claim 44 has been criticized as introducing new matter with respect to the term “glass sheet.”

Applicant respectfully traverses this portion of the rejection.

The present claimed invention clearly describes a continuous glass ribbon. Further, one of ordinary skill in the art would recognize that from the totality of the specification, the term "a glass sheet" is not new matter. Accordingly, withdrawal of this rejection is requested.

Claim 45 has been criticized with respect to the phrase "the chemical vapor deposition process has a minimum temperature . . . to provide sufficient decomposition of the titanium precursor." Specifically, it is indicated that this phrase introduces new matter.

Applicant respectfully traverses this portion of the rejection.

Without admitting that this rejection is correct, Claim 45 has been cancelled. Accordingly, withdrawal of this portion of the rejection is requested.

Claim 46 has been criticized as introducing new matter with respect to the term "to permit a sufficient portion of the coating . . . retains its activity." In addition, Claim 47 has been criticized with respect to the phrase "said coating Has a photocatalytically-activated self-cleaning reaction rate of at least $2 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$."

Claim 46 has been cancelled.

Claim 47 has been amended to recite the reaction rate for the samples produced in accordance with the examples of the present application, specifically, a reaction rate of 8.1×10^{-3} to $9.1 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$. (Claims 49, 51 and 55 have been similarly amended.) This reaction rate is a value calculated from the samples prepared in accordance with Example 1. *See*, paragraph 12 of the attached McCurdy Declaration. Similar amendments have been made to Claims 49, 51 and 55.

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In view of the foregoing, Applicant respectfully submits that Claims 33-55 do not introduce new matter. Accordingly, withdrawal of this rejection is requested.

Referring to page 7 of the Office Action, Claims 33-55 have been rejected under 35 U.S.C. § 112, second paragraph, as assertedly being indefinite.

Four criticisms of the claims are set forth on page 7 of the Office Action in connection with this rejection. These are addressed in series below.

Claim 33 is criticized as being indefinite with respect to the phrase “characteristic of forming the glass float ribbon on a molten tin bath.” Specifically, it is indicated that this phrase is vague and confusing as to what it is referring to. It is also indicated that the same criticism applies to Claims 35, 47 and 49.

Applicant respectfully traverses this portion of the rejection.

The relevant portion of Claim 33 recites “manufacturing a continuous glass float ribbon having a first major surface and an opposite major surface defined as a second major surface, the first major surface having tin diffused therein characteristic of forming the glass float ribbon on a molten tin bath.” As discussed above, when a glass ribbon is manufactured in the well known float glass process, it is manufactured by forming a continuous glass float “ribbon” on a molten tin bath. As such, and as would be appreciated by one of ordinary skill in the art, a characteristic of such a process is that an amount of tin will be diffused into the surface of the glass float ribbon in contact with the molten tin bath. Accordingly, Applicant respectfully submits that Claims 33, 35, 47 and 49 would be understood by one of ordinary skill in the art and, therefore,

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are not indefinite. Accordingly, withdrawal of this portion of the rejection is respectfully requested.

Claim 35 has been criticized as being indefinite with respect to the term “annealing-the” and it is indicated that it is not clear whether the depositing step is different from the production step.

In response, Applicant has amended Claim 35 to correct the typographical error noted by the Examiner. However, Applicant traverses the remaining criticism of Claim 35.

Claim 35 recites the steps of depositing a coating over at least one of the major surfaces by positioning a chemical vapor deposition coating apparatus over the surface of the float ribbon at a point in the manufacture in the float ribbon where the temperature ranges from 590° to 715°C (1100° to 1320°F). The method also includes the step of directing a precursor gas mixture comprising titanium tetrachloride and an organic oxygen containing compound over a surface of the float ribbon and annealing the float ribbon to produce titanium dioxide in the crystalline phase as a photocatalytically-activated self-cleaning coating over the glass float ribbon. Accordingly, Applicant respectfully submits that these steps are clear and withdrawal of this portion of the rejection is requested.

Claim 45 has been criticized as being vague and indefinite with respect to the phrase “the chemical vapor deposition process has a minimum . . . to provide sufficient decomposition of the titanium precursor.” While Applicant does not necessarily agree that this criticism is appropriate, in an effort to advance prosecution of the application, Claim 45 has been cancelled.


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In view of the foregoing, Applicant respectfully submits that Claims 33-55 comply with the requirements of 35 U.S.C. § 112, second paragraph. Accordingly, withdrawal of this rejection is requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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PATENT TRADEMARK OFFICE

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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TITLE:

The title is changed as follows:

~~METHOD FOR DEPOSITING TITANIUM OXIDE COATINGS ON FLAT GLASS~~
~~AND THE RESULTING COATED GLASS~~ METHOD FOR DEPOSITING TITANIUM
OXIDE COATINGS ON FLAT GLASS.

IN THE CLAIMS:

Please cancel claim 45 without prejudice or disclaimer.

The claims are amended as follows:

35. (Amended) A method comprising the steps of:

manufacturing a continuous glass float ribbon having a first major surface and an opposite major surface defined as a second major surface, the first major surface having tin diffused therein characteristic of forming the glass float ribbon on a molten tin bath;

depositing a coating over at least one of the major surfaces by positioning a chemical vapor deposition coating apparatus over the surface of the float ribbon at a point in the manufacture of the float ribbon where the temperature range is from about 590° to 715°C (1100° to 1320°F), directing a precursor gas mixture comprising titanium tetrachloride and an organic oxygen containing compound, wherein the concentration of the titanium tetrachloride is in the range from about 0.1-5.0 % by volume, through said chemical vapor deposition coating apparatus over a surface of the float ribbon and ~~annealing the~~ annealing the float ribbon in air to

produce titanium dioxide in the crystalline phase as a photocatalytically-activated self-cleaning coating over the glass float ribbon.

39. (Amended) The method of claim 38 wherein said titanium dioxide coating has a thickness ~~up to~~ of 1300Å.

41. (Amended) A method comprising steps of:
providing a glass article having at least one surface by a float manufacturing process;
depositing a photocatalytically-activated self-cleaning coating over the surface of the article by chemical vapor deposition during the glass manufacturing process so that the coating has titanium dioxide in the crystalline phase and has a thickness ~~up to~~ of 1300Å.

46. (Amended) The method of claim 42 wherein the photocatalytically-activated self-cleaning coating has a thickness ~~up to~~ of 1300Å to permit a sufficient portion of the coating to remain free of sodium ion poisoning and retain its activity.

47. (Amended) A method comprising the steps of:
manufacturing a continuous glass float ribbon having a first major surface and an opposite major surface defined as a second major surface, the first major surface having tin diffused therein characteristic of forming the glass float ribbon on a molten tin bath, positioning a chemical vapor deposition coating apparatus over the surface of the float ribbon at a point in the manufacture of the float ribbon where the temperature range is from about 590° to 715°C (1100° to 1320°F);

directing titanium tetrachloride in a carrier gas stream through said chemical vapor deposition apparatus over a surface of the float ribbon and annealing the float ribbon to produce

titanium dioxide in the crystalline phase as a photocatalytically-activated self-cleaning coating over the glass float ribbon whereby said coating has a photocatalytically activated self-cleaning reaction rate of ~~at least about $2 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$~~ 8.1×10^{-3} to $9.1 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$.

49. (Amended) A method comprising the steps of:

manufacturing a continuous glass float ribbon having a first major surface and an opposite major surface defined as a second major surface, the first major surface having tin diffused therein characteristic of forming the glass float ribbon on a molten tin bath;

depositing a coating over at least one of the major surfaces by positioning a chemical vapor deposition coating apparatus over the surface of the float ribbon at a point in the manufacture of the float ribbon where the temperature range is from about 590° to 715°C (1100° to 1320°F), directing a precursor gas mixture comprising titanium tetrachloride and an organic oxygen containing compound, wherein the concentration of the titanium tetrachloride is in the range from about 0.1-5.0% by volume, through said chemical vapor deposition coating apparatus over a surface of the float ribbon and annealing the float ribbon to produce titanium dioxide in the crystalline phase as a photocatalytically-activated self-cleaning coating over the glass float ribbon whereby said coating has a photocatalytically activated self-cleaning reaction rate of ~~at least about $2 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$~~ 8.1×10^{-3} to $9.1 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$.

51. (Amended) In a method for forming a glass float ribbon wherein the method includes the steps of melting glass batch materials in a furnace; delivering the molten glass onto a bath of molten tin; pulling the molten glass across the tin bath whereupon the glass is sized and controllably cooled to form a dimensionally stable glass float ribbon; removing the float ribbon

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from the tin bath; moving the float ribbon by conveying roller through a Lehr to anneal the float ribbon; moving the float ribbon to a cutting station on conveying rollers where the ribbon is cut into glass sheets, the improvement comprising:

depositing by chemical vapor deposition a crystalline phase of a photocatalytically-activated self-cleaning titanium dioxide coating over a surface of said float ribbon as the float ribbon is formed whereby said coating has a photocatalytically-activated self-cleaning reaction rate of ~~at least about $2 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$~~ 8.1×10^{-3} to $9.1 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$.

53. (Amended) The method of claim 52 wherein said titanium dioxide coating has a thickness ~~up to~~ of 1300 \AA .

55. (Amended) A method comprising steps of:
providing a glass article having at least one surface by a float manufacturing process;
depositing a photocatalytically-activated self-cleaning coating over the surface of the article by chemical vapor deposition during the glass manufacturing process so that the coating has titanium dioxide in the crystalline phase and has a thickness ~~up to~~ of 1300 \AA whereby said coating has a photocatalytically-activated self-cleaning reaction rate of ~~at least about $2 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$~~ 8.1×10^{-3} to $9.1 \times 10^{-3} \text{ cm}^{-1} \text{ min}^{-1}$.